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Witness Statement

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BEFORE THE
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES
COMMITTEE ON RESOURCES
UNITED STATES HOUSE OF REPRESENTATIVE**

I am Dr. Peter Morton, Resource Economist in the Ecology and Economics Research Department for The Wilderness Society, a 200,000-member national conservation group that focuses on public land issues. I appreciate the opportunity to testify today regarding potential effects of oil and gas resource development in national forest roadless areas.

The Forest Service Roadless Area Conservation Rule has raised concerns by some over the economic impact of prohibiting road construction on domestic energy supplies. The environmental impact statement for the rule presents a good overview of the rule's potential effects on oil and gas development, including some detailed information on reasonably foreseeable development activities. The objective of this testimony is to evaluate the impacts - both positive and negative - of the Roadless Area Conservation Rule to provide decision-makers with additional information relevant to the current debate.

Economic Impacts From the Roadless Rule

The Roadless Area Conservation Rule conserves approximately 58.5 million acres of the public estate managed by the US Forest Service. Conserving these roadless areas will provide for multiple uses, multiple goods and services, and multiple economic benefits for current and future generations. Roadless areas provide backcountry recreation opportunities, represent critical habitat for fish and wildlife - including threatened and endangered species, provide the scenic backdrop for motorized and non-motorized visitors outside roadless areas, generate ecosystem services such as carbon sequestration, natural pest control and watershed protection for local communities, and preserve the option of protecting additional wilderness for future generations. A letter from the Ecological Society of America (Attachment 1), the world's premier society of professional ecologists, underscores the scientific justification for the Roadless Area Conservation Rule.

Although roadless wildlands are highly valued by society, without formal markets, the benefits of wildland conservation are difficult to quantify in economic terms. As a result, non-market wildland benefits are typically under-produced by private landowners responding to market signals. This is a serious shortcoming as certain functions of nature, although they have no market value and their benefits are only partially understood, are necessary to keep America's market economy running. Public lands can help correct market failures by sustaining roadless wildlands that cannot survive the market forces driving private land use decisions. The failure of markets to protect roadless area benefits provides the economic justification for implementing the roadless rule.

The record number of public comments received by the Forest Service in support of the roadless policy provides empirical recognition and support for the multiple uses and benefits generated from roadless area conservation. While no quantitative estimate of the benefits of the rule was provided in the Roadless EIS, the Forest Service believes the benefits of the rule outweigh the costs (USDA Forest Service 2001, Regulatory Impact Analysis). In a more sophisticated analysis, Loomis and Richardson (2000) estimated that in their current, unroaded condition, the 42 million acres of Forest Service roadless wildlands in the lower 48 states can be expected to provide almost $600 million in recreation benefits each year, more than $280 million in passive use values, and nearly 24,000 jobs. The authors also estimated annual benefits from roadless area ecosystem services to include between $490 million and $1 billion worth of carbon sequestration services as well as $490 million in waste treatment services. Estimating the net impacts of the roadless rule should fully account for the benefits of conserving roadless areas as well as the potential costs with respect to the decline in quality and quantity of the other multiple uses generated by the public estate as a result of exploiting energy resources.

The Ecological Footprint of Oil and Gas Exploration and Drilling

Oil and gas drilling operations leave behind a large footprint on the landscape - a footprint that extends well beyond the several-acre drilling sites. Beginning with exploratory activities, large trucks with seismic surveying equipment crisscross the landscape using a crude system of poorly designed roads with at times little consideration for wetlands, storm water runoff or critical habitat. Exploratory drilling operations then require more large trucks with drill rigs using a network of constructed roads to access drill sites. If the exploratory well is determined to have no potential for production, the well is plugged, but the landscape scars remain. Depending on the agency with oversight, there is typically little enforcement or monitoring of environmental regulations. In addition, no surety bonds are required for restoration or clean up.

If the well has potential for production, the well is cased with pipe and cemented (in an attempt to prevent oil and gas from seeping into nearby aquifers), and the drilling rig is replaced by a well head. Electric or gas powered motors are used to power the pumps that collect the gas at each well and to power the series of 24-hour compressor stations that pressurize gas for pipeline transport from the wells to customers in distant markets (WORC 1999). Many drill sites also involve the construction of sediment ponds and retention reservoirs to collect storm water drainage and store the ground water brought to the surface as a result of the drilling and extraction operation - the latter process is called dewatering. Injection wells are sometimes used to dispose of the water produced and to enhance oil and gas recovery - an action that may necessitate additional drilling of a few to hundreds of injection wells throughout the field (Gauthier-Warinner 2000). The ecological footprint not only extends across the forest and range landscape, it also penetrates to shallow aquifers as well as aquifers thousands of feet below the earth's surface.

Water and the Uncounted Costs From Oil and Gas Extraction

The major uncounted environmental cost associated with oil and gas drilling concerns water. National Forest roadless areas provide important watershed protection services for downstream communities, services that are negatively impacted by oil and gas drilling. In the lower 48 states, 55% of the watersheds that contain

IRAs provide water to downstream facilities that treat and distribute drinking water to the public (LaFayette 2000, Watershed Health Specialist Report).

Greatly increased drilling activity for coal bed methane is having profound real life impacts on many families and communities in the West and illustrates well some of these impacts. In order to "release" the methane gas from coal beds, enormous amounts of ground water must be pumped from coal aquifers to the surface. The water discharged on the surface comes from shallow and deep aquifers containing saline-sodic water. The total amount of water produced from individual coalbed gas wells is generally much higher than that from other types of oil and gas wells (USGS 1995). Coal bed methane wells in Wyoming and Colorado discharge between 20,000 to 40,000 gallons per day per well, onto the ground surface (Darin 2000). The disposal of the water produced with coalbed gas not only affects the economics of development, but also poses serious environmental concerns. Water disposal can vary from inexpensive methods, such as discharge into streams, to more costly alternatives, such as underground injection and surface discharge after water treatment.

The amount of water discharged from CBM wells in Wyoming has skyrocketed in recent years, increasing from approximately 98 million gallons (300 acre feet) per year in 1992, to 5.5 billion gallons (17,000 acre feet) per year in 1999 (Wyoming State Engineer's Office cited in Darin 2000). The discharging of 17,000 acre feet of water in the arid west is wasteful in the short-term (generally an acre-foot of water will supply a family of four for one year), and has potentially devastating economic impacts for affected communities in the long-term. Dewatering of deep aquifers may upset the hydrologic balance, eliminating or reducing the availability of this water for future agricultural and domestic uses, as well recharge for shallow aquifers and surface water.

The discharge of ground water can deplete freshwater aquifers, lower the water table, and dry up the drinking water wells of homeowners and agricultural users. Monitoring of wells maintained by the BLM in the Powder River Basin, Wyoming already indicates a drop in the coal aquifer of over 200 feet (WORR 1999). The short-term economic costs include drilling new, deeper wells for current and future homeowners, ranchers and farmers, assuming successful wells can be found and/or the costs of relocating families to new homesites. If the freshwater aquifers do not fully re-charge, the long-term economic costs to affected landowners, homeowners, communities, and states across the west could be severe, including the foregone opportunity (option value) to use aquifer water in the future.

The water discharged from oil and gas wells is highly saline with a very high sodium absorption ratio (SAR) - a ratio that affects how water interacts with soil. Water with a high SAR can permanently change chemical composition of soils, reducing soil, air and water permeability and thereby decreasing native plant and irrigated crop productivity. Test results from water discharged from CBM wells from 3 sites in Wyoming all revealed SARs exceeding a level that could result in a 30-40% decrease in plant productivity (Powder River Basin Resource Council 2000).

The discharge of tens of thousands of gallons of ground water transforms many streams that normally flow intermittently only during spring runoff or after storms into all-season streams (Powder River Basin Resource Council 2000). The influx of water has resulted in deep channel scouring, erosion, and increased sedimentation. Increased sedimentation in streams can negatively impact native fisheries found in mainstream drainages with increased likelihood and financial costs from fishery restoration projects. The discharge of water into intermittent stream channels damages native flora and fauna not adapted to year-round water and promotes the spread of noxious weeds such as Scotch burr and Canadian thistle. The change in native vegetation composition, combined with the increase in noxious weeds, negatively impacts threatened and endangered species and other wildlife, as well as cattle. The loss of native species and the spread of noxious weeds across the west has enormous economic costs to the public and private interests.

The landscape is also impacted from the retaining ponds or reservoirs constructed to store the water discharged from the drilling operation. The constructed earthen dams and retaining ponds destroy additional habitat and introduce artificial structures to the landscape. Habitat and homes on property nearby reservoirs also have potential flood risk from structural failure of the poorly designed, quickly built retaining ponds and reservoirs during storm events, for example.

And finally, drilling for oil involves ecological risks and potential economic costs associated with blowouts -- the catastrophic surge of the highly pressurized fluid from the drill hole that can cause fires, loss of life and property, and the potential contamination of surface drinking water sources. To reduce the number of blowouts, rotary drilling operations typically inject a fluid of drilling muds into the drill hole in order to lubricate and cool the drill bit. While reducing the number of blowouts, the drilling fluids themselves create a risk of contamination of adjacent freshwater aquifers (Gauthier-Warinner 2000).

The Uncounted Costs From Drill Sites, Pipeline and Road Infrastructure.

The exploitation of unconventional gas resources (e.g. continuous-type and coalbed methane) will require hundreds of thousand of wells to be drilled. Exploiting the gas in continuous-type deposits will also require drilling a significant number of wells, as these deposits are randomly distributed. Based on existing technology, the USGS indicates that nationwide approximately 960,000 productive wells will be required to recover potential gas reserve additions of 300 trillion cubic feet. However the habitat loss would not end there as extrapolation of present-day success ratios indicates that that roughly 570,000 "dry" holes would have to be drilled in addition to the productive wells - for a total of 1,530,000 drilling sites on public and private lands. Based on an industry report in Alaska (cited in NPC 1999) while past drilling pads consumed about 65 acres of habitat, recent operations average less than 10 acres. If we assume 5 acres per drilling pad and 1,530,000 drill sites, exploitation of just the continuous-type gas deposits would consume approximately 7.7 million acres of habitat on public and private land across the nation. As noted by the USGS (http://energy.usgs.gov/factsheets/GIS/gis.html), "land-use planners are not in a good position to determine the societal impacts of the drilling (density) that would be necessary if these continuous reservoirs of (tight) gas were exploited."

In order to bring gas to market, thousands of miles of pipeline must also be constructed - extending the impacts of gas drilling far from the actual drill site. There are currently more than 270,000 miles of gas transmission pipelines and another 952,000 miles of gas distribution lines. The National Petroleum Council (1999) projects a need to build 38,000 and 255,000 miles of additional transmission and distribution pipelines, respectively, by 2015.

Oil and gas exploration also requires roads that increase ecological costs and invite cross-country travel and habitat damage by ORVs. Oil and gas drilling often require daily vehicular trips to monitor and maintain wells and pipelines. The increased traffic disrupts wildlife, may result in more road kill, and diminishes quality of life for local residents. The linear deforestation associated with road construction degrades habitat and fragments travel corridors needed by wildlife species such as grizzly bears, wolves, and other large, wide-ranging predators. Roads become conduits for non-native species that displace native species resulting in significant mitigation costs for taxpayers. Roads, by providing access, increase the frequency of human-caused fires. Humans cause ninety percent of all wildfires in the national forests; more than half of those wildfires begin along roads. In addition, roads increase the damage to historical, cultural and archeological resources due to increased ease of access.

Roads also increase sediment deposits in streams resulting in reductions in fish habitat productivity. In addition to keeping sediment from access roads and drill sites of community water sources, roadless areas protect communities from mass wasting (e.g. landslides). Mass wasting from landslides and debris flows is a key source of sediment, particularly in western forests, and many of the roadless areas are at high risk from landslides. In Colorado and Wyoming, for example, over 1,146,000 and 645,000 acres of roadless areas, respectively, have high susceptibility to landslides (Table 3). While landslides are a natural process, management activities like road construction and logging accelerate the incidence of mass wasting by several orders of magnitude (Swanson 1971, Anderson and others 1976, Swanson and Swanston 1976, Sidle and others 1985, Swanston 1991). For example, a joint FS and BLM study in Oregon and Washington found that of 1290 slides reviewed in 41 subwatersheds, 52% were related to roads, 31% to timber harvest, and 17% to natural forest (USDA Forest Service 1996 cited in LaFayette 2000, Watershed Specialist Report). The Forest Service concluded that the Roadless Area Conservation Rule "would have a considerable beneficial effect on water quality, particularly in Regions 1 and 4." (the Northern Rockies)

Table 3. National Forest Roadless Areas with High Landslide Susceptibility for Select States

State	Acres of Roadless Areas with high Risk of landslides*	Percent of FS roadless areas with high susceptibility to landslides
Colorado	1,146,000	33
Wyoming	645,000	21
Montana	564,000	15
Utah	492,000	14

*NOTE: This is a conservative estimate of roadless acres classified as highly susceptible to landslides, as these totals did not consider the 21 million acres in roadless acres allocated to prescriptions that do NOT allow road construction and reconstruction, some of which have may high susceptibility to landslides (USDA FS Watershed Specialist Report 2000).

The uncounted economic costs from road construction for oil and gas drilling include increased ORV monitoring costs, increased frequency and costs of stream restoration projects, increased noxious weed mitigation costs, increased damage to archaeological sites and the decline in future benefits from visiting these sites, increased water treatment costs for downstream communities, and increased road maintenance and closure costs for taxpayers. On average, the annual maintenance cost of a mile of road is about $1,500 per mile (USDA FS 1999). Each new mile of road added to the FS transportation system competes for limited road maintenance funding, as Congressional funding is less than 20% of the funding necessary to maintain the existing road infrastructure. One must seriously question the wisdom of building more roads when current roads can't be maintained, and each year's unmet maintenance needs increase the backlog as roads deteriorate and the costs of repairs increase over time.

Examples of the economic costs from energy exploitation are summarized in Table 4 and should be included as part of the discussion on the net impacts from the Roadless Areas Conservation Rule. While many of these costs are difficult to estimate, academic and federal agency economists have made great advances in developing methods to value non-market costs and benefits. Included in the table are methods available for estimating the economic costs, to drive home the point that these costs are quantifiable and should be included in the economic calculus. Many heretofore-unquantifiable wildland benefits and costs are now quantifiable and available to agency officials responsible for developing the policies and procedures for guiding public land management. We therefore strongly encourage the USGS to internalize non-market costs into the cost functions used to estimate economically recoverable resources.

Table 4 The Uncounted Economic Costs of Mining, Oil and Gas Extraction

Cost Category	Description of Potential Cost	Methods for Estimating Cost
Direct Use	Decline in quality of recreation including hunting, fishing, hiking, biking, horseback riding.	Travel cost, contingent valuation surveys.
Community	Air, water and noise pollution negatively impacts quality of life for area residents with potential decline in the number of retirees and households with non-labor income, loss of educated workforce with negative impacts on non-recreation business. Decline in recreation visits and return visits negatively impact recreation businesses.	Surveys of residents and businesses. Averting expenditure methods for estimating costs of mitigating health and noise impacts. Change in recreation visitation, expenditures and business income. Documenting migration patterns.
Science	Oil and gas extraction in roadless areas reduces value of area for study of natural ecosystems and as an experimental control for adaptive ecosystem management.	Change in management costs, loss of information from natural studies foregone.
Off-site	Air, water and noise pollution affect quality of downstream and downwind recreation activities. Drilling rigs in viewsheds reduce quality of scenic landscapes, driving for pleasure and other recreation activities and negatively impacts adjacent property values. Groundwater discharged can negatively impacts adjacent habitat, property, and crop yields, while depleting aquifers and wells.	Contingent valuation surveys, hedonic pricing analysis of property values, preventive expenditures, well replacement costs, restoration and environmental mitigation costs, direct impact analysis of the change in crop yields and revenues.
Biodiversity	Air, water and noise pollution can negatively impact fish and wildlife species. Ground water discharged changes hydrological regimes with negative impacts on riparian areas and species. Road and drill site construction displaces and fragments wildlife habitat.	Replacement costs, restoration and environmental mitigation costs,
Ecosystem services	Discharging ground water negatively impacts aquifer recharge and wetland water filtration services. Road and drill site construction increase erosion causing a decline in watershed protection services.	Change in productivity, replacement costs, increased water treatment costs, preventive expenditures.
Passive use	Roads, drilling and pipelines in roadless areas results in the decline in passive use benefits for natural environments.	Contingent valuation surveys, opportunity costs of not utilizing future information on the health, safety and environmental impacts of oil and gas drilling.

Adapted from Morton (2000)

Preliminary Analysis of Oil and Gas Resources in National Forest Roadless Areas

As indicated by the Forest Service in the EIS for roadless rule, it is very difficult to evaluate the reasonably foreseeable potential for oil and gas development in Inventoried Roadless Areas (IRAs). While significant energy resources underlie some IRAs, there has been very little interest in leasing or drilling in roadless areas or other national forest lands. It is wildly unrealistic to estimate the potential economic impacts of protecting IRAs based on total quantities of oil and gas resources in IRAs. That is like estimating timber industry impacts based on the total number of board feet of timber in IRAs - a pointless exercise that would result in a grossly inflated and inaccurate economic impact estimate. While the EIS does not include extensive data on oil and gas resources in IRAs, it presents a realistic picture of the overall economic effects of prohibiting roads.

As a starting point in evaluating economic effects, The Wilderness Society undertook an assessment of the energy potential of federal lands in general and roadless areas specifically. The assessment included a GIS analysis of the oil and gas resources in national forest roadless areas for 6 states in the Intermountain West. These 6 states were selected as they represent the states with major oil and gas plays and they have significant acreage of national forest IRAs. Following are some preliminary results; we expect to have final results later this spring.

Data

We obtained data from the USGS 1995 National Assessment of United States Oil and Gas Resources, which divides the US into eight regions and subdivides those regions into 72 geologic provinces, with each province containing a number of individual plays. Plays are defined by the USGS as a set of known or postulated accumulations of oil or gas that share similar geologic, geographic and temporal properties. A separate GIS coverage for each of the 199 plays in the six western states (North Dakota, Wyoming, Montana, Colorado, Utah and New Mexico) was obtained from the USGS in ARC/INFO export format (Weller 2001). These coverages define the boundaries of the oil and gas plays. The National Inventoried Roadless Areas (IRA) GIS coverage was downloaded in ARC/INFO export format from the USDA Forest Service Roadless Area Conservation website. This dataset contains all National Inventoried Roadless Areas (IRAs) for the lower 48 states.

Methods

A Geographic Information System (GIS) and ARC/INFO software were used to determine the area of overlap between IRAs and oil and gas plays. The IRA coverage was clipped to the boundary of each of the six states in the study area to create an IRA coverage for each state. The state IRA coverages were then intersected with each play that falls within that particular state to identify the IRAs that overlap with each play. Plays could not be appended into a single oil and gas play coverage, because different plays are located within different geologic formations, and therefore their geographic boundaries often overlap each other.

The results of the intersection analyses were then used to calculate the number of acres of each play that lie within IRAs, as well as the number of acres of each individual IRA that overlap with different plays. The total acres of each play were also determined in order to obtain the percent of each play that coincides with IRAs. In order to estimate technically recoverable oil and gas resources in IRAs we multiplied the percentages by the estimated oil and gas resources for each play, taken from the USGS 1995 Assessment. Economically recoverable resources within IRAs were then estimated using a model based on the financial cost functions and recovery rates developed by the Attanasi (1998). Our estimates are based on the USGS mean value for each resource. USGS mean values represent the expected value and provide the best, unbiased estimate of oil and gas resources.

Results for Technically Recoverable Resources

The technically recoverable oil in national forest IRAs for the 6 states in the intermountain west are reported in Table 1. The technically recoverable resources are those that may be recovered using existing technology without regard to cost or profit. For this report, oil totals include both petroleum oil and gas liquids from conventional and unconventional sources. The 754 million barrels of technically recoverable oil represent only four-tenths of one percent (0.4%) of the nation's oil resources. The technically recoverable gas in the IRAs in the 6 western states is reported in Table 2. The 8.7 trillion cubic feet (Tcf) of gas in IRAs represents six-tenths of one percent (0.6%) of the nation's gas resources.

Table 1. Mean Estimates of Technically and Financially Recoverable Oil in Inventoried

Roadless Areas on the National Forests

State	Technically recoverable oil (millions of barrels)	Technically recoverable oil as Percent of US Oil Resources (on and off-shore)	Financially Recoverable Oil at $18/barrel (Millions of barrels)	Financially Recoverable Oil at $30/barrel (Millions of barrels)
Montana	9	0.004	4	6
Wyoming	663	0.35	367	501
N. Dakota	13	0.007	1	3
Colorado	32	0.017	11	19
New Mexico	2	0.001	1	2
Utah	34	0.018	14	22
6-State Total	754	0.39	398	552

<u>Results for Financially recoverable resources</u>

The financially recoverable resources are that part of the technologically recoverable resources that can be recovered with a profit. To be considered financially recoverable the market costs of gas recovery must be less than or equal to the gas price (Goerold 2001). When financial criteria are considered, the oil and gas actually recoverable drops significantly (USGS 1998). For the lower 48 states, only 38 and 39 percent of the technically recoverable undiscovered oil and gas, respectively, can be extracted profitably when oil is $18 per barrel and gas is $2 per mcf (thousand cubic feet). At $30 per barrel and $3.34 per mcf, two-thirds of the technically recoverable oil and gas is financially profitable to recover (Attanasi 1998).

Financial recovery rates are even less for unconventional oil and gas resources (continuous-type gas and coal bed gas) than for the conventional resources. For continuous-type gas, only 7 and 15 percent of the technically recoverable gas is financial to find, develop and produce at $2/mcf and $3.34/mcf, respectively (Attanasi 1998). For continuous-type oil accumulations at $18 and $30 per barrel, about 7 percent and 50 percent, respectively, of the technically recoverable oil is financially feasible to exploit (Attanasi 1998). For unconventional coal bed gas, about 30 percent of the technically feasible gas is financially recoverable at $2 per mcf, while at $3.34 per mcf, the financial portion increases to slightly more than 50 percent (Attanasi 1998).

The financially recoverable oil in IRAs on the national forests is shown in Table 1. Assuming oil prices of

$18 or $30 per barrel, oil in the IRAs of these 6 states would meet total US oil consumption for approximately 21 or 29 days, respectively (e.g. 552/18.92=29). When financial factors are considered the quantity of gas available also drops dramatically (Table 2). At $2 and $3.34 per thousand cubic feet (mcf), the financially recoverable gas in these IRAs would meet total US gas consumption for approximately 2 or 3 months, respectively.

Table 2. Mean Estimates of Technically and Financially Recoverable Gas in Inventoried Roadless Areas on the National Forests

State	Technically Recoverable Gas (Trillion Cubic Ft.)	Technically Recoverable as Percent of US Gas Resources (on and off-shore)	Gas Financially Recoverable at $2/mcf (trillion cubic feet)	Gas Financially Recoverable at $3.34/mcf (trillion cubic feet)
Montana	0.405	0.029	0.191	0.256
Wyoming	5.278	0.386	2.108	2.798
N. Dakota	0.125	0.009	0.006	0.013
Colorado	2.336	0.171	0.885	1.363
New Mexico	0.067	0.005	0.019	0.026
Utah	0.486	0.036	0.224	0.332
6-State Total	8.696	0.636	3.446	4.782

The financially recoverable totals reported above are based on USGS estimates of economically recoverable resources. The costs that the USGS uses in assessing the costs of oil and gas production include items such as the direct costs of exploration, development and production of gas. Not included in the USGS calculus are non-market costs such as the off-site ecological costs and cumulative negative environmental impacts that might result on a public resource such as a watershed (Goerold 2001). An economic analysis of benefits and costs must account for non-market benefits and costs, as well as those more readily observed and measured in market prices (Loomis and Walsh 1992; Pearse 1990). An economic analysis is conducted from the viewpoint of society, which should also be the viewpoint of politicians and managers of the public estate. In contrast, a financial analysis only examines costs and benefits as measured by market price; it is the viewpoint of private industry and is more concerned with profits or losses.

The USGS economically recoverable analysis more closely resembles a financial analysis than an economic analysis. A more accurate estimate of the economically recoverable resources from a public perspective should include a full accounting of non-market costs. If economic analysis accounted for the uncounted, non-market costs discussed earlier, the quantities of oil and gas estimated to be economically recoverable would be much less than reported here.

Energy Impacts from the Roadless Area Conservation Rule are Minimal

As discussed earlier, raw estimates of technically or financially recoverable oil and gas resources do not provide even a remotely accurate measure of the reasonably foreseeable economic effects of roadless area protection. For example, the roadless area conservation rule conserved approximately 58.5 million acres of public wildlands on the national forests. However, the roadless rule would not change management prescriptions on 24.2 million acres, representing 41% of the IRAs. There would be no impacts from the roadless rule on these acres as existing land management plan prescriptions already prohibit road construction (USDA Forest Service 2001). The policy discussion on impacts of the roadless rule should therefore focus on the 59% of the IRAs where management policy was actually changed as a result of the final rule.

Furthermore, the oil and gas industry has demonstrated little interest in exploiting potential energy resources in IRAs. Because of the downturn in the domestic oil and gas economy, the amount of National Forest System land under oil and gas lease dropped from about 35 million acres in the mid-1980s to 5.8 million acres in 1998 (USDA Forest Service 2000). The national forests are not a major supplier of gas. In 1999, the National Forest system produced about 0.4% of the nation's gas supply, with about half of that total coming from Little Missouri Grasslands (USDA Forest Service 2000). As such the impacts on current and reasonably foreseeable supply from a change in national forest management are minimal.

Most roadless areas have been available for leasing for decades. Extensive portions of the lands which the oil and gas industry believes have high potential are already under lease and therefore would not be affected by this rule. Currently 759,000 acres of IRAs with high oil and gas potential are under lease (USDA Forest Service 2001). Most of these areas are within the Intermountain, Northern, and Rocky Mountain regions. Existing leases are not subject to the prohibitions. The roadless rule would have no effect on existing oil and gas leases. In fact, it provides for future leasing, with roadbuilding, on lands currently under lease. This exception will reduce economic impacts on current operators, by avoiding the possibility of increasing the costs of production or precluding future development on the lease if restrictions had been applied at the time of lease extension or renewal.

In addition, just because an IRA is off-limits to road construction does not mean that underlying energy resources are impossible to develop. The roadless rule could affect extraction of oil and gas in IRAs in the future where road construction is required. However, this impact can be minimized by the use of extended reach drilling and other technological improvements that can allow access to oil and gas resources 5-6 miles from the drilling site (NPC 1999). With 380,000 miles of roads and an extended drilling reach of 5-6 miles, it is questionable whether lack of additional road access is really a significant issue.

Public concerns and environmental safeguards for protecting sensitive lands and resources are also key factors limiting oil and gas development. While standard leases govern gas drilling on 59% of Federal land in the Rocky Mountain region, only 9 percent of the federal land in the region is actually off limits while 32 percent is subject to access restrictions (NPC 1999). These restrictions are not, however, without purpose. For example, seasonal closures designed to protect wildlife populations may slow down the rate of gas exploitation but protect the wildlife and other multiple-uses under which public land is managed. Such protection is warranted economically, as watershed protection, hunting, fishing and recreation generate significantly more economic benefits to all Americans, including affected residents and business in the Rocky Mountain Region, than oil and gas extraction. Legislative intent and public sentiment indicate that public lands should not be for the exclusive use of the oil and gas industries and that managers must attempt to balance the many uses that occur on public land. Environmental

restriction help internalize the uncounted costs from oil and gas extraction mentioned previously by protecting other multiple uses enjoyed by the public.

With respect to energy prices, the quantities of financially recoverable oil and gas in IRAs are very small and will have no impact on energy prices that are set on the world market. Extracting or not extracting oil and gas in IRAs will have absolutely no impact on short-term energy prices since IRAs resources could not be added to current production for at least 5-10 years (USDA Forest Service 2001). In addition, a substantial amount of undiscovered, unconventional gas resources in the IRAs are categorized by the USGS as hypothetical resources and are associated with higher extraction costs than conventional resources. Producers have limited ability to exploit hypothetical sources within an expedient time frame. The hypothetical nature of much of the unconventional resource underscores the inability of IRA oil and gas resources to impact current energy prices.

The oil and gas resources that may affect energy prices already exist in discovered known reserves and in the growth of these reserves. Currently discovered reserves and expected reserves growth account for 42% of US onshore gas supplies (USGS 1995). It is these resources, the financially feasible gas resources in and around the already discovered reserves, that have the potential to impact short-term energy prices - not the unknown and hypothetical, small quantities of undiscovered gas resources in roadless wildlands far from existing pipelines.

Conclusion

Based on our analysis, The Wilderness Society concludes that IRAs hold very small quantities of oil and gas, and drilling in IRAs on the national forest is economically inefficient and will do nothing to reduce current energy prices for consumers. While economics should not be the driving force behind public policies, we agree with the Forest Service conclusion that IRAs should be protected from oil and gas drilling as the benefits of the Roadless Area Conservation Rule outweigh the costs. While The Wilderness Society also agrees that gas is the bridge fuel for the future, it is important to recognize that the extraction of gas, a cleaner burning fuel than coal, involves significant ecological and economic costs. It is important for the public to be aware of these costs and internalize them into their public land management and energy consumption decisions. The United States has less than 5 percent of the world's population but consumes 40% of the oil and 23% of the gas (USGS 2001). As such there is much we as a nation can do via investments in energy conservation and renewable energy to reduce our consumption, and the ecological and economic costs associated with our consumption levels (NRDC 2001).

We strongly support the Roadless Area Conservation Rule's prohibition on road construction for oil and gas development and other forms of resource extraction. At the same time, we believe the protection of roadless areas should not be used as an excuse to exacerbate the impacts of drilling for gas next to homes or private property where the families do not own the sub-surface mineral rights (i.e. split estate). We recommend a programmatic EIS on gas drilling where it is adversely affecting homeowners, ranchers, and communities. Such an approach in needed until adequate baseline conditions are firmly established and funding is obtained for long-term monitoring and mitigation to assess and minimize environmental impacts and long-term costs. Such a comprehensive approach is desperately needed in Wyoming where gas drilling, especially drilling for coal bed methane, is causing extreme damage to water supplies and other environmental values.

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